



# Parts List, Operating & Maintenance Manual for Wells No. 5 Metal Cutting Bandsaws



*Wellsaw*®



**Wellsaw**®

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## For Your Convenience

When contacting your WELLSAW supplier or the Company for parts or service, it is helpful to have both your saw Serial Number and Purchase Date available. Jot them down her for handy reference.

**Serial Number:** \_\_\_\_\_

**Purchase Date:** \_\_\_\_\_

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# Specifications

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<b>Standard Capacity:</b>	Rectangular .....	5" x 10"
	Rounds.....	5" dia.
<b>Speeds:</b>	Three Speed Saw –FPM .....	60, 90, 130
	Four Speed Saw - FPM.....	50, 90, 160, 250
<b>Motor Size:</b> .....		1/3 HP
<b>Swivel Vise:</b> .....		to 45°
<b>Blade Size:</b> .....		8'3" x 1/2" x .025"
<b>Height to top of bed:</b> .....		25-1/2"
<b>Width of Bed</b> .....		8-1/2"
<b>Drive:</b> .....		"V" Belt
<b>Floor Space required:</b> .....		21" x 50"
<b>Shipping Weight, (approx).</b> .....		365 lbs.
	With Coolant.....	420 lbs.

Blades are available for No. 5 Wells saw in a variety of tpi

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# SAFETY INSTRUCTIONS

## Know your machine, its safe and proper use!

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**DISCONNECT POWER** before adjusting or servicing the saw or changing a blade.

**STAY CLEAR** of all moving parts. Keep hands and fingers away from the saw blade.

**WHEN MOVING SAW**, with hinged frame (saw head), secure the head in its down position.

**WHEN CUTTING MAGNESIUM**, take special precautions. Use a sharp saw blade, make only dry cuts, prevent chip accumulation, and keep fire-fighting equipment nearby.

**THIS SAW SHOULD BE GROUNDED WHILE IN USE TO PROTECT THE OPERATOR FROM ELECTRICAL SHOCK.**

**CORD CONNECTED TOOLS.** If the saw is equipped with an approved 3-conductor cord and a 3-prong grounding type plug, it should only be connected to a properly equipped and grounded receptacle. The green conductor in the cord is the grounding wire. Never connect the green wire to a live terminal.

Use only a 3-wire extension cord having a 3-pronged receptacle, a 3-pronged plug and ample amperage rating. Replace or repair a damaged or worn cord immediately.

**PERMANENTLY CONNECTED TOOLS.** The saw should be connected to a grounded, metal-enclosed wiring system or an equipment-grounding conductor should be run with the circuit conductors and connected to the saw's grounding terminal or lead.

To reset the manual starter after a power interruption, return the switch to OFF and press the RESET button before restarting.

### FOR ALL TOOLS

**KEEP GUARD IN PLACE** and in working order.

**REMOVE ADJUSTING KEYS AND WRENCHES.** Form a habit. Check to see that all keys and wrenches are removed from the tool before turning the tool on.

**KEEP WORK AREA CLEAN.** Cluttered areas and benches invite accidents.

**AVOID DANGEROUS ENVIRONMENT.** Do not use power tools in damp or wet locations. Keep your work area well lighted.

**KEEP CHILDREN AWAY.** All visitors should be kept a safe distance from work area.

**MAKE WORKSHOP KID-PROOF** with padlocks, master switches, or by removing starter keys from tools.

**DON'T FORCE TOOL.** It will do the job better and safer at the rate for which it is designed

**USE RIGHT TOOL.** Don't use a tool or attachment to do a job for which it was not designed.

**WEAR PROPER APPAREL.** No loose clothing or jewelry to get caught in moving parts. Rubber-soled footwear is recommended for best footing.

**USE SAFETY GLASSES.** Also use face or dust mask if operation is dusty.

**SECURE WORK.** Use clamps or a vise to hold work. Provide adequate support to prevent injury from falling work pieces.

# INSTALLATION, OPERATION and MAINTENANCE of the No. 5 WELLS METAL CUTTING BANDSAW

The **No. 5 METAL CUTTING BANDSAW** was designed for efficient performance, and with proper care will give you many years of dependable service.

Each saw is completely assembled, checked thoroughly and subjected to a test run; no further adjustments should be necessary.

This manual has been prepared to assist you in the proper installation, operation and maintenance of your new Wells Metal Cutting Band Saw. If you should desire additional information or assistance, we suggest you contact your dealer's service representative.

**Read this manual carefully. It was prepared to help you.**

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## **INSTALLATION**

Upon receipt of machine, uncrate and check all parts. Report to your carrier any damage to machine and file Proof of Loss Claim with same.

- Place motor in position on motor pivot post and install V-Belt.
- Be sure motor specifications correspond with your power line.
- Place machine so that each leg is carrying its share of the load.

**Read instructions carefully.**

## **OPERATION**

- **Do not apply too much feed at first on new blade.**
- **Start cut carefully and the blade will last much longer.**
- **Make sure all four legs are in solid contact with the floor.**
- **Keep blade guides as close to both Vise Jaws as possible.**

## **PLACING BLADE ON SAW**

- Raise frame to extreme height.
- Remove blade guard on high side of frame.
- Turn idler band wheel tension screw until the blade will slide on wheels easily. With blade uncoiled, place in roller guides and between brushes, then over band wheels.
- Grasp blade on frame side and push toward guide bracket beam to hold in position, then turn tension

screw until the blade is taut.

- Start motor and tighten blade to proper operating tension.
- Make certain that the blade teeth point same way blade is running; if not, this can be accomplished turning the blade inside out.

## **AUTOMATIC STOP**

When the saw blade has completed the cut through the material, the saw frame drops on a trigger to which a rod is attached. This rod passes through the frame of the machine to the switch on the opposite side, and opens the contacts, thereby stopping the saw.

**It will be necessary to raise saw frame clear of the trigger before machine can be started.**

## **FIXED VISE JAW**

The two pins in the fixed vise jaw should be kept in place in order to insure square cuts. When cutting angles, these pins must be removed and the vise jaws turned to desired position and tightened with clamp bolts. These pins enable operators to quickly relocate fixed vise jaw for 90° cutting. **For final adjustment, the vise jaw should be squared with the blade.**

The sliding vise jaw should be loosened and pushed against fixed vise jaw and then tightened.

## **NEW BLADE TENSIONING DEVICE**

On saws equipped with **blade tensioning device**, tighten hand wheel tension screw until **gauge bar is flush with end of casting.**

## SLIDING VISE JAW

The sliding vise jaw is equipped with a ratchet and ratchet dog for quick action and with a hand wheel for tightening work in vise.

**Excessive pressure is not required to hold material securely in the vise.**

## MAXIMUM CAPACITY

To obtain maximum vise capacity remove vise jaw pins and move fixed vise jaw toward motor end. Make sure stock in vise will not strike the ratchet arm.

## DASH POT

Machines are equipped with a dash pot (frame check) for the purpose of stabilizing the downward travel of the saw frame, thereby protecting saw blade from damage. The action is hydraulic and controlled by flow of fluid being bypassed through an orifice in the piston on the downward stroke. **Only light hydraulic oil should be used in the cylinder.**

## SWITCH

A “**STOP-START**” switch is installed across the line to protect the wiring and brushes of the motor. A thermal coil is provided which breaks the circuit should an overload occur in the line. The operator should allow time for coil to cool before trying to start after the circuit has been broken.

Automatic shut-off operates when saw frame contacts the switch trigger, which is attached to the frame rest.

## BELT

Usually the weight of the motor holds the belt tight enough, but in case it does not, the clamp on the swivel post should be tightened.

## SPEED SELECTION

Saws are equipped with step pulleys, which provide a selection of speed ranges:

- Use the fast speed to cut thin-wall metal, tubing, thin channels, aluminum, thin brass, or any metal that will not burn the teeth.
- Use the medium speeds on general cutting such as cold rolled, machine steels, heavy channels, etc.
- Use the slow speed for cutting nickel steels or any metals which require a slow speed on a lathe.
- Use beeswax when cutting brass. Brass should always be cut with a blade which has not previously cut other metal.
- If teeth wear off unusually fast, use slower speed. Always keep the blade at proper blade tension when cutting.

## MAINTENANCE

### BLADE GUIDES

The blade guides are arranged to hold the blade in alignment both vertically and horizontally.

**Before making any adjustments, always try a new blade to be sure that the old blade was not causing the difficulty.**

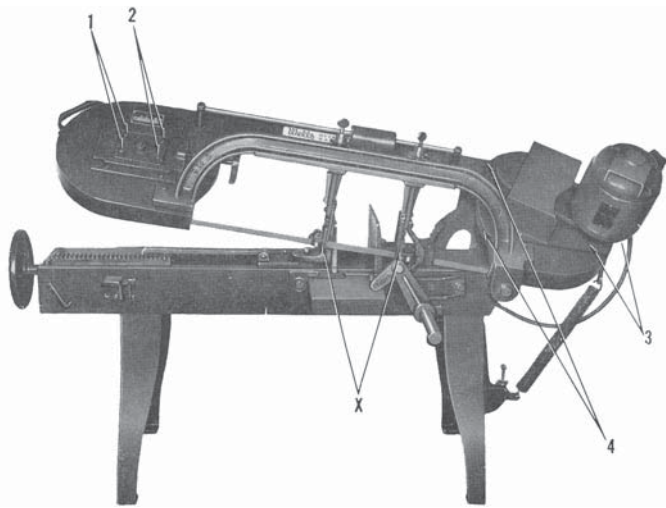
**To align the blade horizontally**, be sure fixed vise is square with bed, then square blade with vise. If out of alignment, loosen one upper set screw in “Roller Adjuster” (M-92) and tighten opposite set screw, moving blade in desired direction.

**For the vertical alignment**, raise frame until blade just clears bed, then place edge of square on bed with end against blade being careful not to contact tooth set. Use feeler gauge not to exceed .002”, adjusting blade so that feeler gauge will not enter at top or bottom between end of square and blade. If out of alignment, loosen one lower set screw in “Roller Adjuster” (M-92) and tighten opposite set screw, moving blade in desired direction. For this vertical alignment, check blade at both front and rear guides.

Adjust the side roller guides (#100406-001) with the eccentric axle until both rollers contact blade. When this adjustment is made, the rollers should be adjusted so that the **path of the blade is straight** and blade is not forced to curve around the rollers. The back edge of the blade should be even with the top surface of the side rollers. The top roller guide (#100406-001) should be in contact with back of blade at all times.

**Always keep set screws and thumb screws tight.**





## WHEEL PITCH ADJUSTMENT

### Loosen Blade Before Making These Adjustments!

In case the blade runs too low, or off the idler wheel, adjust the wheel block to which the wheel is mounted. To do this, **loosen the two cap screws** marked “1” one-half turn and **tighten two cap screws** marked “2” an equal amount.

To make similar adjustment on drive wheel at motor end, it is necessary to **loosen the two cap screws** at “3”, then make pitch adjustment by loosening **two hollow head set screws** at “4” and **tighten two hollow head set screws** at “3”. The **four cap screws** should then be **tightened** to hold motor plate in a rigid and fast position.

If there is too much pitch on the wheel the blade will run too high. This will cause the blade to become distorted and the back of the blade will be rolled over, also the wheel rim flange will show excessive wear. To correct this condition, **loosen two cap screws** at “2”, **tighten two cap screws** at “1”. **Loosen two cap screws** at “4”, then make pitch adjustment by **loosening two hollow headset screws** at “3” and **tightening two hollow head set screws** at “4”. The **four cap screws** should then be **tightened** to hold motor plate in a rigid and fast position.

## FRAME WEIGHT ADJUSTMENT

Place weight on slide bar at motor end of slide and remove dash pot, before adjusting frame spring under motor end, The frame spring should be adjusted for approximately 10 lbs. Use slide weight to make final feed adjustment. The cutting pressure, which determines the feed, should not be increased to a point where the blade starts to run sidewise while cutting. Large stock will stand a heavier feed than small stock.

## BLADE BRUSHES

**Brushes** should be **cleaned frequently** in kerosene and reversed to take advantage of both rows of bristles.

For best results, replace worn, filled or sticky brushes with new ones. In bolting brushes to angles, be sure wire bristles are bent in same direction blade travels.

## LUBRICATION

- The **correct** and **adequate lubrication** is a very **important** factor in determining the life and service to be obtained. It is imperative that all dust and dirt should be removed before lubricating.
- Keep **vise adjusting screw well lubricated** with a medium type of grease.
- The **gears** in the **gear case** are lubricated with a metal penetrating type of grease that will not channel. A small quantity of this lubricant can be added through hole in side of gear case when required.
- The **electric motor** has sealed-type ball bearings and should be oiled at regular intervals according to standard practices, when repacking, a high grade medium type of grease should be used.
- Keep **internal ring gear** and **pinion** well greased with a good quality fiber type grease (medium grade). For proper inspection and for greasing these gears, it is necessary to remove the drive wheel.
- Lubricate the motor pivot post with a few drops of machine oil. If properly lubricated, the weight of the motor will keep the belt tight, and allow easy speed changes.
- Wheel ball bearings are lubricated by pressing out the bearings and repacking them with a good quality of ball bearing grease.

**Keep machine clean and be sure no cuttings are allowed to mix with lubricants, as this forms an abrasive which is detrimental to the operation of the machine.**

**Use only hydraulic oil for dash pot.**

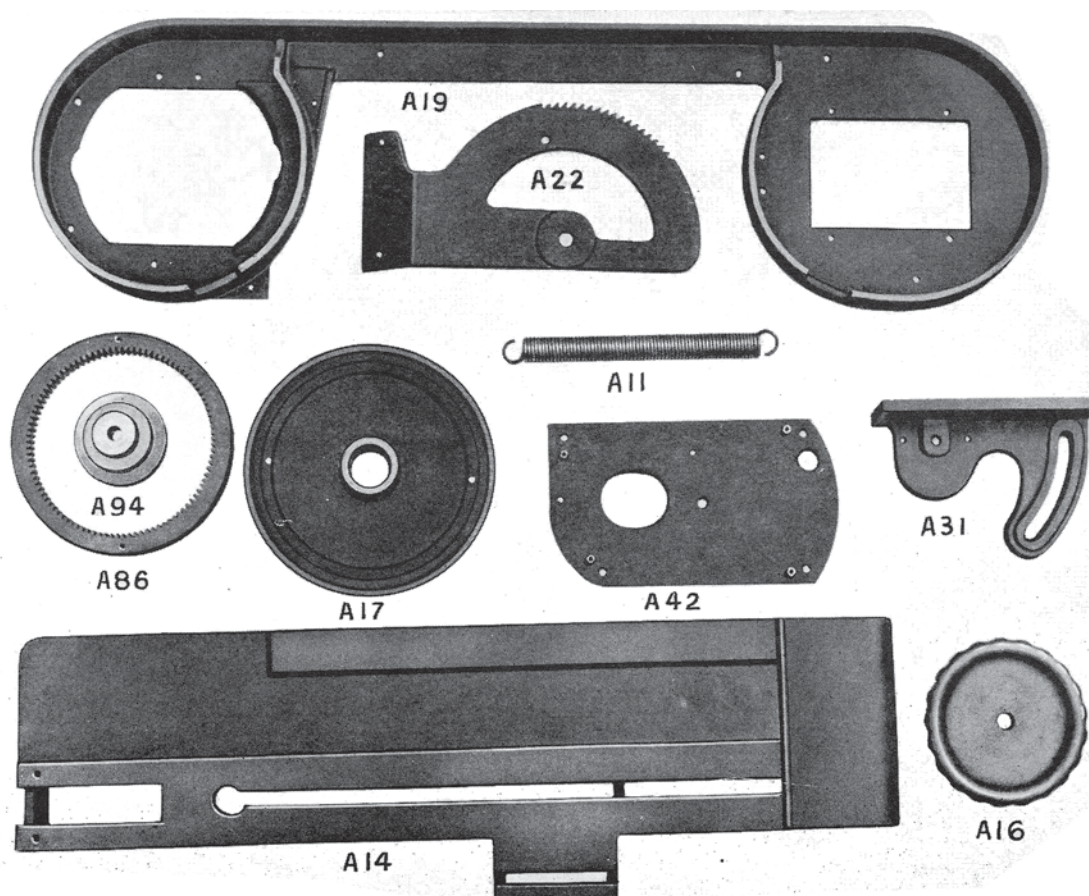
# Trouble Shooting

## For Greater Service and Efficiency Careful Operation - Blade Consideration

DIFFICULTY	REASON	REMEDY
<b>Cutting out of line</b>	<i>Too heavy a feed or worn blade</i>	Reduce feed rate by adjusting frame weight or replace blade. Replace worn guide bearings when they begin to show excessive wear
	<i>Guides in wrong position</i>	Set as close to work as possible
	<i>Guides out of alignment</i>	Follow adjustment instructions
	<i>Set worn on one side of blade</i>	Keep brushes clean. Avoid teeth rubbing in cut by applying enough weight so that each tooth is cutting a good chip
	<i>Starting cut on odd shape where blade does not contact flat surface</i>	Retard feed until blade has a good start in the material
<b>Stripping teeth</b>	<i>Blade teeth too coarse</i>	Be sure that two or more blade teeth are in contact with material being cut
	<i>Hard spots on material</i>	Rotate stock, if possible. Do not put new blade in cut at same angle
<b>Breaking</b>	<i>Guides out of alignment</i>	Follow adjustment instructions.
	<i>Blade twisting</i>	Adjust guides as close to work as possible. Be sure material being cut is held firmly
	<i>Lack of blade tension</i>	Always keep blade tight
	<i>Dash Pot malfunction</i>	Check hydraulic fluid level and/or condition of cup leather
<b>Excessive wear</b>	<i>Blade speed too fast.</i>	Follow recommended cutting speeds
<b>Blade running off wheel</b>	<i>Lack of blade tension</i>	Always keep blade tight
	<i>Improper wheel pitch adjustment</i>	See instructions for wheel pitch adjustment

**Always use a light feed on new blades!**

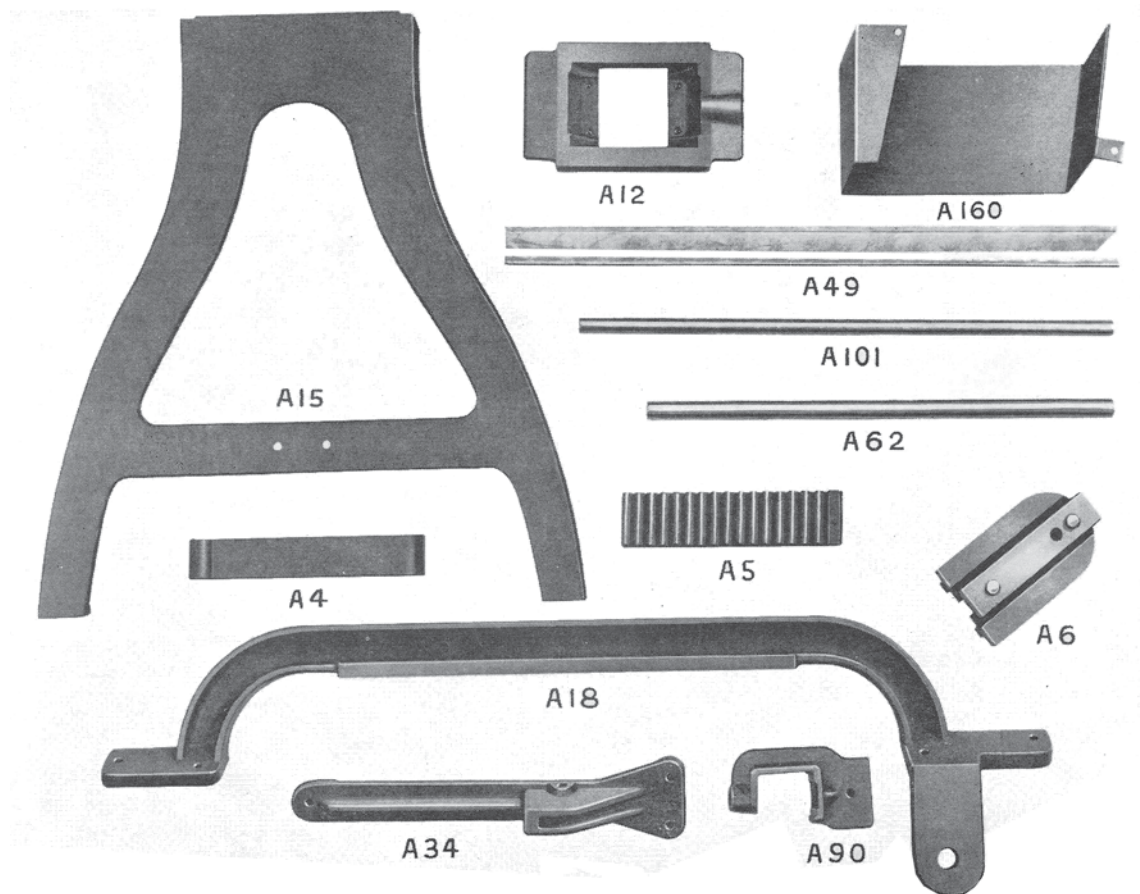
## Replacement Parts



A11	Spring
A14	Bed
A16	Hand Wheel
A17A	Band Wheel, Drive (shown as A17)
A17B	Band Wheel, Idler (not shown)
A19	Saw Frame
A22	Ratchet Arm
A31	Fixed Vise Jaw
A42	Motor Plate
A86	Internal Ring Gear
A94	Motor Pulley (3 speed saw)
101172-1	Motor Pulley (4 speed saw)



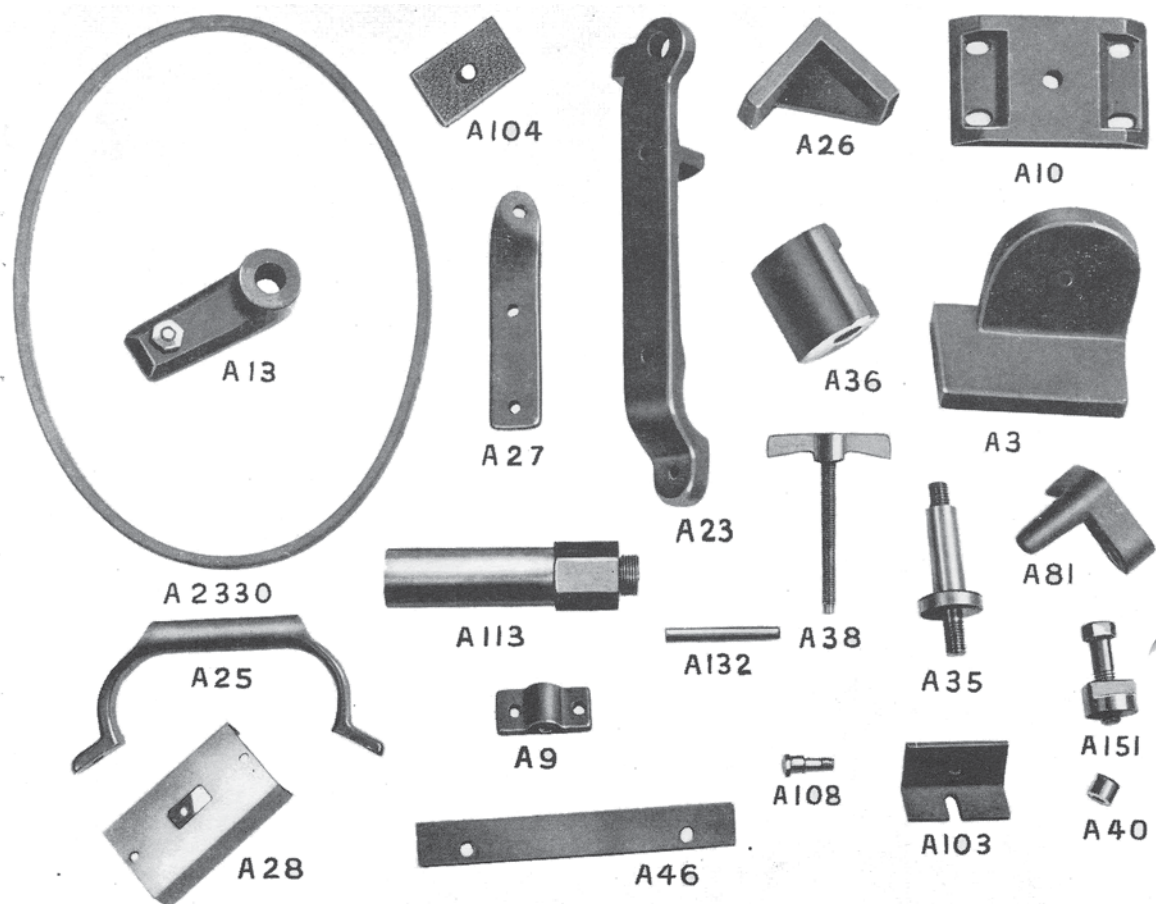
# Replacement Parts



- A4 Vise Ratchet Dog
- A5 Vise Ratchet
- A6 Vise Slide Block with (A45) Vise Slide Block Guide. For assembled unit order both parts
- A12 \*Wheel Slide Block (3 speed saw)
- A15 Leg
- A18 Guide Bracket Beam
- A34 Spring Adjuster Housing
- A49 Blade Guard
- A50 Frame Pivot Bar (shown on page 11)
- A54 Switch Rod used with Bryant No. 3972 (shown on page 12)
- A62 Stock Stop Bar
- A90 Roller Guide Bracket
- A101 Sliding Weight Bar
- A160 \*Belt Guard (3 speed saw)
- A163 Bracket Thumb Screw (not shown) same as M163
- A174 Switch Rod used with CH No. 9115 (not shown)

\*Refer to page 13 for replacement part number of later model saws.

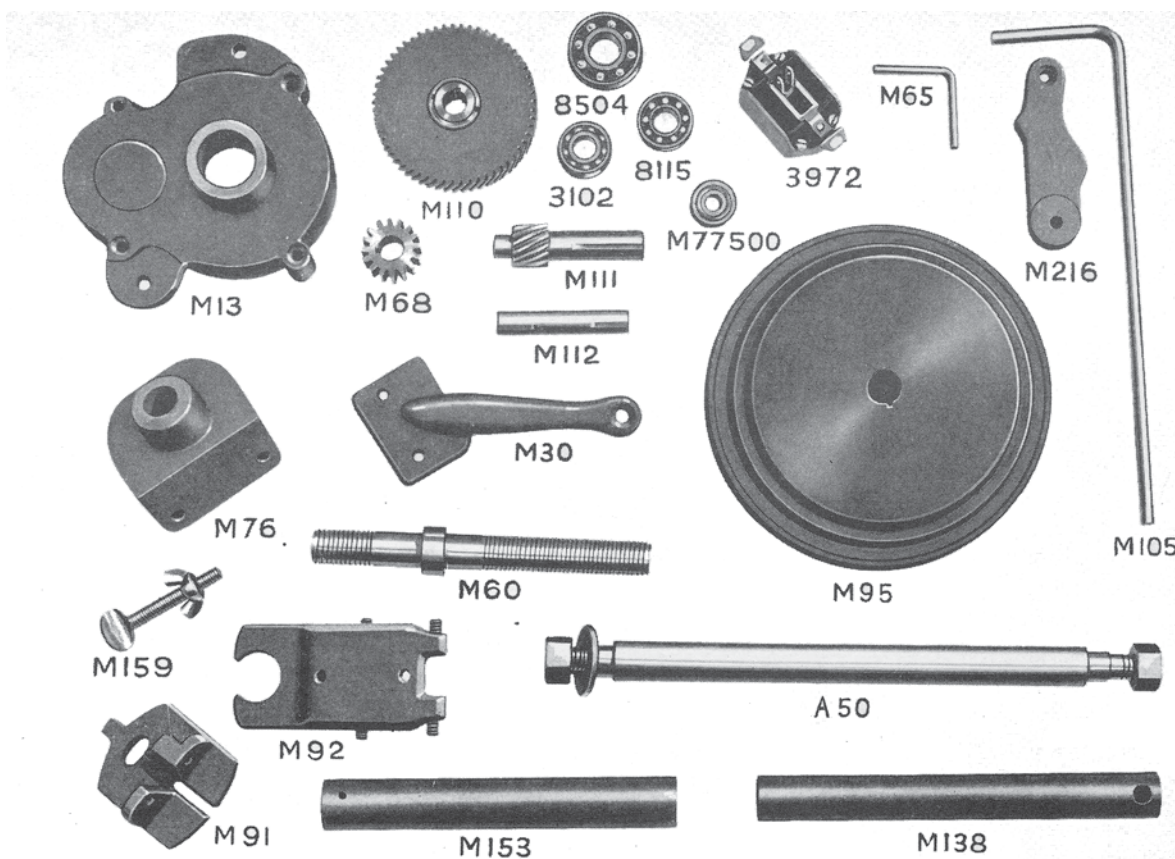
# Replacement Parts



- A3 Sliding Vise Jaw
- A9 Wing Screw Block
- A10 Wheel Adjusting Block
- A13 Stock Stop Gauge
- A23 Ratchet Dog Arm
- A25 Frame Handle
- A26 Frame Rest
- A27 Dash Pot Bracket
- A28 Switch Cover (Bryant)
- A35 Wheel Axle (not furnished) order M429
- A36 Stock Stop, Arm Housing
- A38 Take Up Screw (complete unit)
- A40 Vise Ratchet Guide Spool
- A46 Wheel Slide Block Guide
- A81 Ratchet Dog
- A103 \*Blade Brush Angle (inside frame)
- A104 \*Blade Brush (inside frame)
- A108 Short Eccentric Roller Axle
- A113 \*Motor Pivot Post (3 speed saw)
- A132 Vise Ratchet Dog Hinge Pin
- A151 Clamp Nut Only
- A2330 \*V Belt, same as 2330
- A157 Cable, Motor to Switch (see page 12)

\*Refer to page 13 for replacement part number of later model saws.

# Replacement Parts



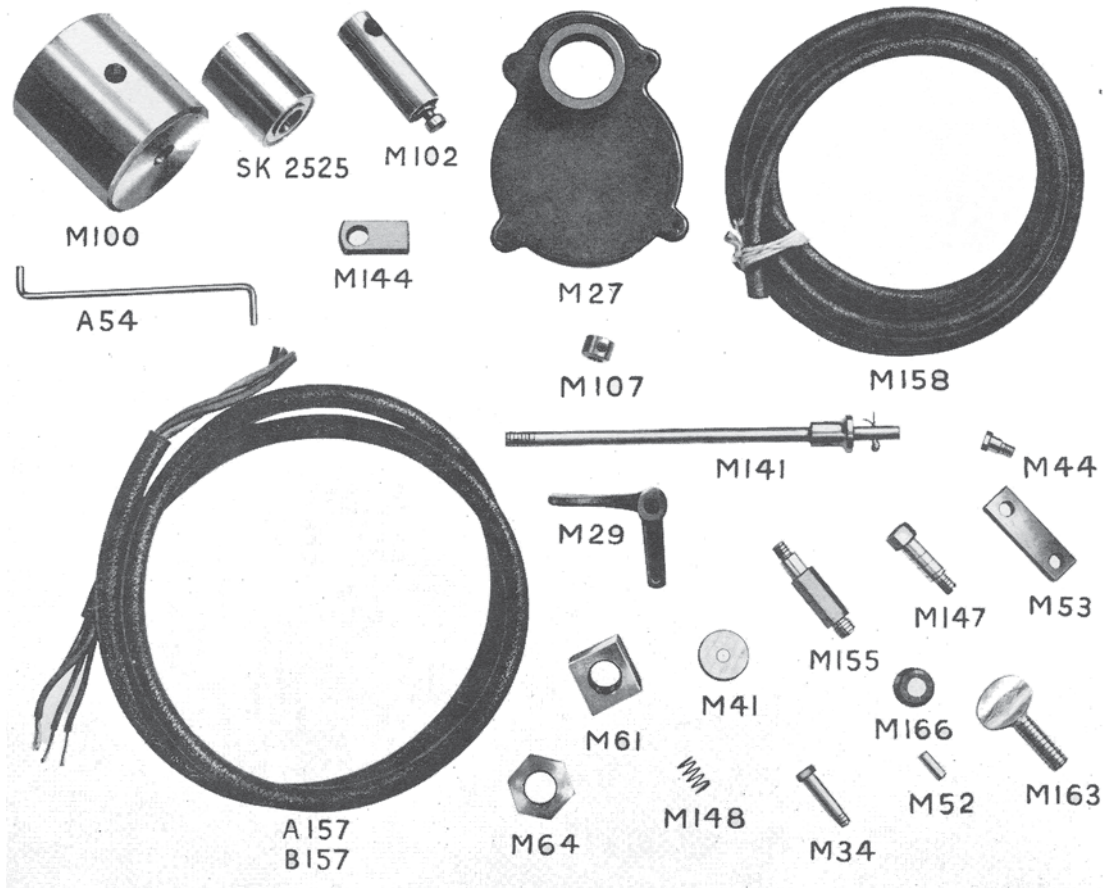
M13	Gear Case
M30	Frame Spring Arm
A50	Frame Pivot Bar
M60	*Vise Screw with M177 Collar Assembled Unit
M65	Fixed Vise Jaw Locking Pin
M68	*Drive Pinion
M76	Vise Screw Bracket
M91	Roller Support
M92	Roller Adjuster
M95	*Driven Pulley (3 speed saw)
M105	Rod Ratchet Lever
M110	*Plastic Gear with M165 Hub
M111	*Pulley Shaft and Pinion (.625 dia)
M112	*Drive Pinion Shaft
M138	Cylinder for Dash Pot (inner)
M153	Cylinder for Dash Pot (outer)
M159	Thumb Screw and Wing Nut for Spring Adjuster
3102	Ball Bearing for Lower End M111 Pulley Shaft
3972	Switch. Call factory with complete specs

8115	Ball Bearing for Pinion Shaft
8504	Ball Bearing for Upper End M111 or M171 Pulley Shaft; also for Band Wheels
100406-001	Blade Guide Bearings
M216	Spring

The following parts are not shown:

M156	5/16 x 7/8 Thin Head Cap Screw
M167	5/8 Nut with Set Screw for Frame Pivot Bar
M168	Washer for Dash Pot Cup, leather
M171	Pulley Shaft and Pinion .590 diameter
M172	Spacer for A35
M181	Switch Rod Post (CH No. 9115)
M189	*Driven Pulley Key
M190	Plastic Gear Key
3202	Ball Bearings for Lower End M171 Pulley Shaft

## Replace Parts



M27	Gear Case Cover
M29	Switch Trigger
M34	Switch Trigger Axle
M44	Short Roller Axle
M52	Motor Plate Pivot Pin
M53	Motor Plate Pivot Pin Holder
M61	Vise Screw Nut
M64	7/8 x 9 LH Lock Nut for Vise Screw Hand Wheel
M100	Steel Sliding Weight (not furnished - order No. M807 - cast)
M102	Sliding Weight Post
M107	Ratchet Rod Lever Collar
M141	Dash Pot Piston Rod with M142 Piston, assembled unit
M144	Dash Pot Piston Rod End
M147	Dash Pot Lower Bolt
M148	Dash Pot Spring
M155	Dash Pot Upper Stud

A157	Cable, Motor to Switch, No. 5 Saw
SK2525	Wheel Ball Bearing (not furnished) Replaced by two ND No. 8504 Bearings and one M172 Spacer
M158	Cable, Complete, Motor to Outlet (not furnished)
M163	Thumb Screw for Sliding Weight, used with M100
M166	Dash Pot Cup Leather

The following parts are not shown:

M54	Switch Rod
M188	Driven Pulley Spacer
M198	Blade Brush Bracket
M425	Blade Brush Angle
M426	Blade Brush
M807	Cast Iron Sliding Weight
M857	Sliding Weights Stop Spring



## Replacement Parts for Later Model No. 5 Wells Metal Cutting Bandsaws

A12	Wheel Slide Block used on saws up to and including Serial No. 5M-6841. Later model saws order No. 101171.	M68	Drive Pinion used on saws up to and including Serial No. 5M-7302 Order a 101643 Drive Pinion Shaft Assembly (includes drive pinion, drive pinion shaft and roll pin). Later model saws use 101645 Drive Pinion drilled for roll pin.
A103	Blade Brush Angle (inside frame) used on saws prior to Serial No. 2975. Later model saws use M425 Blade Brush Angle.	M95	Driven Pulley used on 3 speed saws. For 4 speed saws order 101156 Driven Pulley.
A104	Blade Brush (inside frame) used on saws prior to Serial No. 2975. Later model saws use M-426 Blade Brush.	M110	Plastic Gear with M165 Hub replaced with M327 for all model saws.
A113	Motor Pivot Post for 3 speed saw. Order 101157 Motor Pivot Post for 4 speed saw.	M111	Pulley Shaft and Pinion (.625 dia.) replaced with one M171 Pulley Shaft & Pinion and one 3202 Ball Bearing for 3 speed saw. Order 101187 Pulley Shaft & Pinion for 4 speed saw.
A160	Belt Guard for 3 speed saw. Order 101182 Belt Guard for 4 speed saw.	M112	Drive Pinion Shaft used on saws up to and including Serial No. 5M-7302. Order a 101643 Drive Pinion Shaft Assembly (includes drive pinion, drive pinion shaft and roll pin). Later model saws use 101644 Drive Pinion Shaft.
A2330	V Belt used on 3 and 4 speed saws order No. 100066-5.	M189	Driven Pulley Key for 3 speed saw. Order No. 100056-15 for 4 speed saw.
M60	Vise Screw with M177 Collar Assembled Unit replaced with M307 for all model saws.		

## Replacement Parts - Blade Tensioning Device

101162	Take Up Support	101402	Tension Gauge Nut Assembly
100004-15	Cap Screw	S20	Tension Spring
1000410-1	Bearing	101171	Slide Block
101167	Take Up Screw Assembly		



# Wellsaw® Select-O-Chart

To assist in selecting the right blade and the right speed for your job!

Speed = Suggested blade speed in feet-per-minute

Feeding pressure: L = light, M = medium, H = heavy • T = teeth per inch

Stock Dimensions Tooth Pitch	Up to 1" 10/14, 8/12		From 1" - 3" 6/10, 8/12, 5/8		From 3" - 6" 5/8, 4/6, 3/4, 3 Sab.		Over 6" 3/4, 2/3, 2 Sab., 1 Tooth, 3/4" T.S.	
Material (Annealed)	Blade Spee (SFPM)	Cutting Rate (SIPM)	Blade Spee (SFPM)	Cutting Rate (SIPM)	Blade Spee (SFPM)	Cutting Rate (SIPM)	Blade Spee (SFPM)	Cutting Rate (SIPM)
<b>Carbon Steels:</b>								
1008-1013	250	8 - 10	275	9 - 12	280	12 - 15	250	9 - 12
1015-1018	250	8 - 10	275	9 - 12	250	12 - 15	230	9 - 12
1048-1065	200	5 - 7	200	5 - 7	175	8 - 10	150	6 - 8
1065-1095	200	4 - 6	200	5 - 7	150	6 - 8	120	6 - 8
<b>Free Machining Steels:</b>								
1108-1111	300	9 - 11	330	12 - 14	275	13 - 15	220	11 - 14
1112-1113	300	8 - 11	330	11 - 13	275	12 - 15	220	12 - 15
1115-1132	300	7 - 10	330	10 - 13	275	13 - 16	220	11 - 14
1137-1151	275	6 - 8	250	8 - 10	250	8 - 11	200	7 - 10
1212-1213	300	8 - 10	320	11 - 13	300	13 - 15	255	11 - 14
<b>Manganese Steels:</b>								
1320-1330	250	5 - 7	250	5 - 8	200	8 - 11	175	7 - 10
1335-1345	250	5 - 7	225	5 - 7	200	7 - 9	175	5 - 8
<b>Nickel Steels:</b>								
2317	270	4 - 5	270	4 - 6	250	5 - 7	230	4 - 6
2330-2345	220	2 - 3	220	3 - 5	190	3 - 5	170	3 - 5
2512-2517	200	2 - 3	200	3 - 5	160	4 - 6	150	4 - 6
<b>Nickel Chrome Steels:</b>								
3115-3130	260	4 - 6	260	5 - 7	230	5 - 7	225	5 - 7
3135-3150	220	4 - 6	200	4 - 7	180	6 - 8	150	5 - 8
3310-3315	200	3 - 4	180	4 - 5	180	5 - 7	160	4 - 6
<b>Molybdenum Steels:</b>								
4017-4024	300	3 - 5	270	4 - 7	250	6 - 8	220	5 - 8
4032-4042	300	3 - 5	270	4 - 7	250	6 - 8	230	5 - 8
4047-4068	250	3 - 5	220	4 - 6	200	5 - 7	180	3 - 5
<b>Chrome Moly Steels:</b>								
4130-4140	280	4 - 6	250	5 - 8	250	8 - 10	220	6 - 8
4142-4150	230	3 - 5	200	4 - 6	200	5 - 7	170	4 - 6
<b>Nickel Chrome Moly Steels:</b>								
4317-4320	250	3 - 5	225	4 - 6	200	5 - 7	170	4 - 6
4337-4340	230	3 - 4	200	4 - 5	200	4 - 6	170	4 - 5
8615-8627	250	4 - 5	230	6 - 7	230	6 - 8	200	6 - 7
8630-8645	250	3 - 5	230	4 - 6	230	5 - 7	180	4 - 6
8647-8660	220	2 - 4	200	3 - 5	200	4 - 6	150	3 - 5
8715-8750	250	3 - 5	220	4 - 6	220	5 - 7	180	4 - 6
9310-9317	200	1 - 3	160	2 - 3	160	2 - 4	150	2 - 3
9437-9445	250	4 - 5	230	4 - 5	230	5 - 6	180	4 - 5
9747-9763	250	2 - 4	230	3 - 5	200	4 - 6	180	3 - 5
9840-9850	240	4 - 5	220	4 - 6	200	5 - 7	180	4 - 6
<b>Nickel Moly Steels:</b>								
4608-4621	250	3 - 5	220	5 - 6	220	6 - 7	200	5 - 6
4640	220	3 - 5	200	4 - 6	200	5 - 7	170	4 - 6
4812-4820	200	3 - 5	180	3 - 5	180	4 - 6	160	4 - 5
<b>Chrome Steels:</b>								
5045-5046	280	4 - 6	250	5 - 7	250	8 - 10	200	7 - 8
5120-5135	280	4 - 6	250	6 - 7	240	7 - 8	180	5 - 8
5140-5160	250	3 - 5	230	4 - 6	230	5 - 7	200	4 - 6
50100-52100	180	2 - 4	160	3 - 5	150	4 - 6	100	3 - 5
<b>Chrome Vanadium Steels:</b>								
6117-6210	225	4 - 5	225	5 - 7	200	6 - 8	170	5 - 7
6145-6152	225	3 - 4	200	4 - 5	200	5 - 6	150	4 - 5
<b>Silicon Steels:</b>								
9255-9260	200	2 - 4	180	3 - 5	180	3 - 5	150	3 - 5
9261-9262	200	1 - 3	160	2 - 3	160	2 - 4	150	2 - 3